

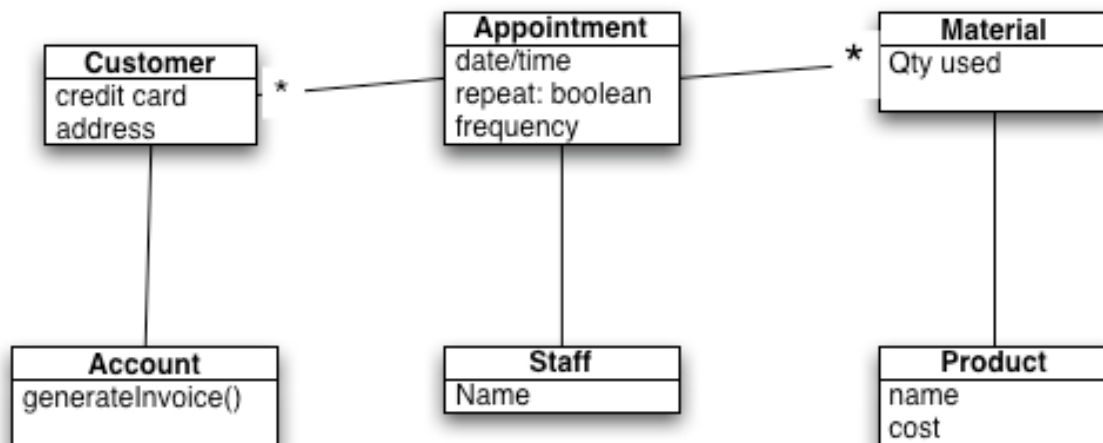
**QUESTION 1 (20 + 10 + 5 + 5 = 40 marks)**

Busy Bees Home Cleaning Service employs a number of cleaners that take cleaning jobs from a central dispatch service.

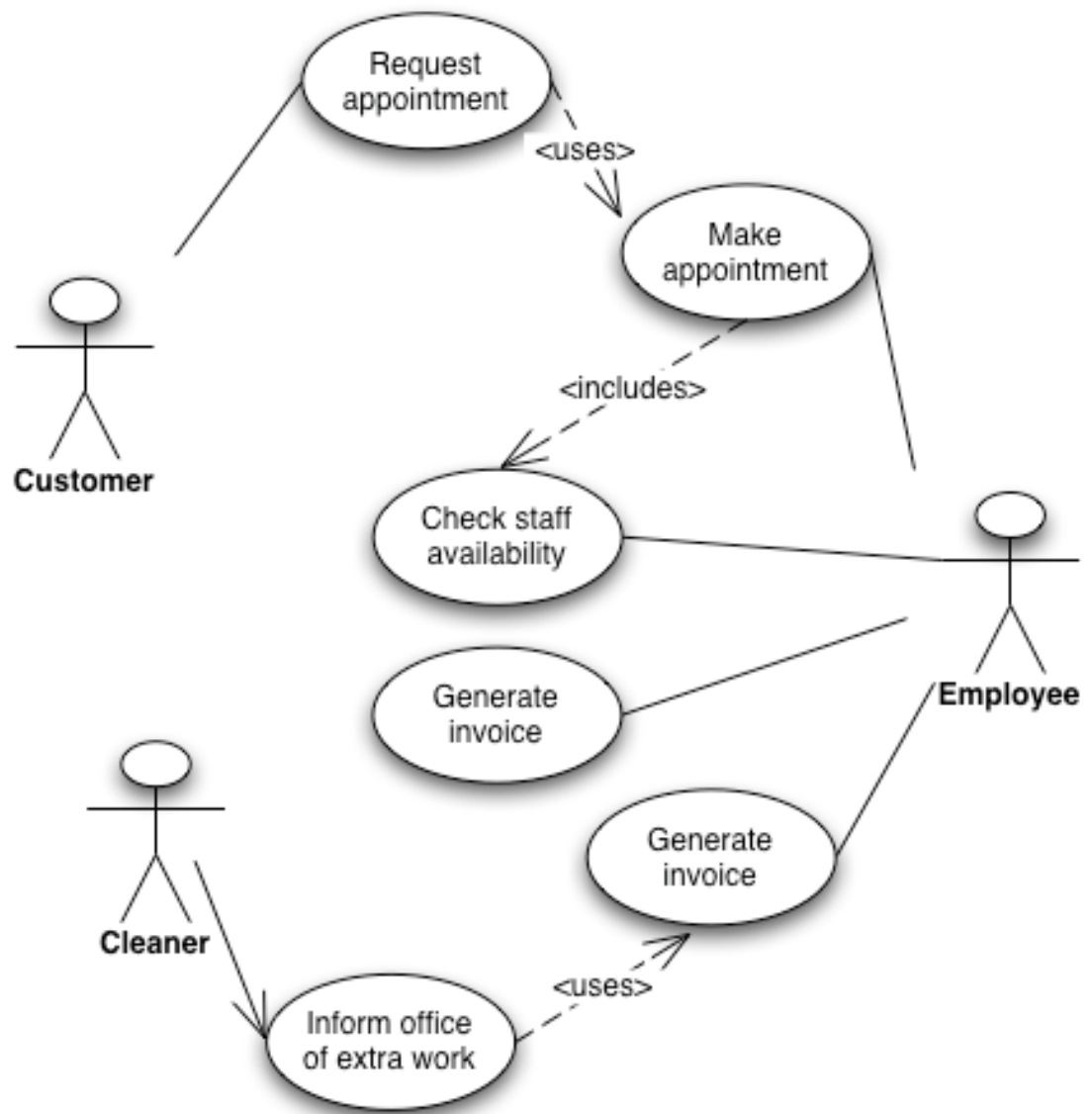
Customers can request a cleaning job by phoning and making an appointment. The employee that takes the call checks if there is sufficient staff for the appointment. If there is the employee records the customer and appointment. If there isn't the staff member suggests other times that are available.

Customers can also request a regular cleaning service (e.g. weekly), as well as a specific cleaner. If there is any variation in the job (e.g. the customer request that windows be cleaned in addition to the normal cleaning job) the cleaner informs the office before the bill is credited to the customer's account. Most customers are charged via their credit card; regular customers can have an account that they are invoiced for monthly (payable within 30 days). A payment statement is always generated and sent to the customer detailing the charges made, and any materials that were required.

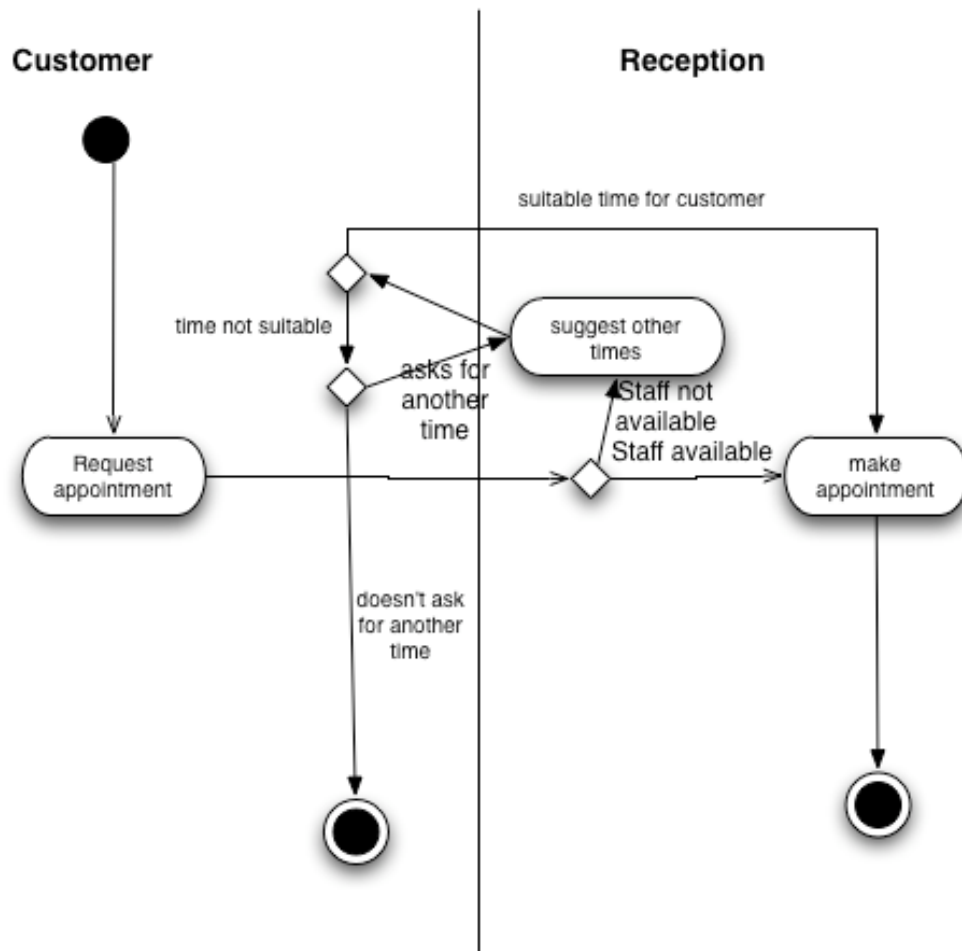
a) Draw a class diagram.



b) Draw a use case diagram.



c) Draw an activity diagram for a customer requesting a cleaning job.



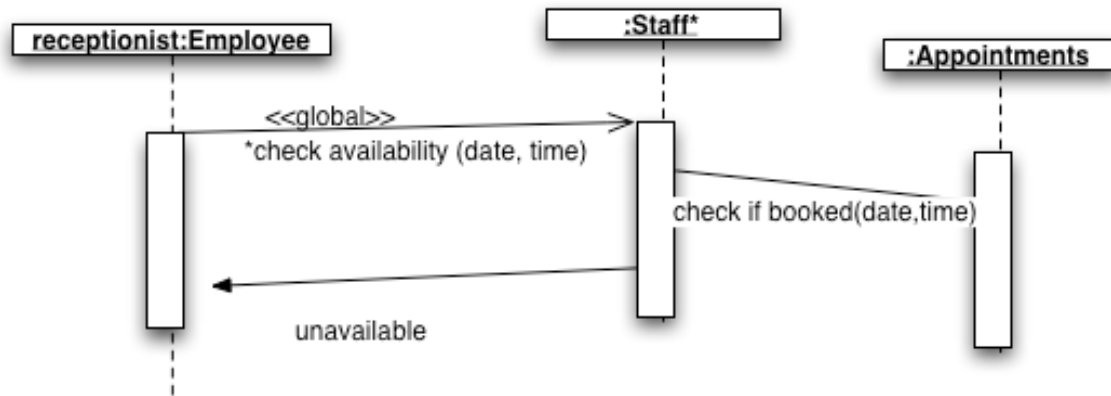
## Marking

1 mark for “swimming lanes”

3 marks for correct flows

1 mark for start/end points

- d)** Draw a sequence diagram for the scenario where a customer requests a booking, but no cleaning staff are available at the requested time.



### Marking

1 mark for correct syntax

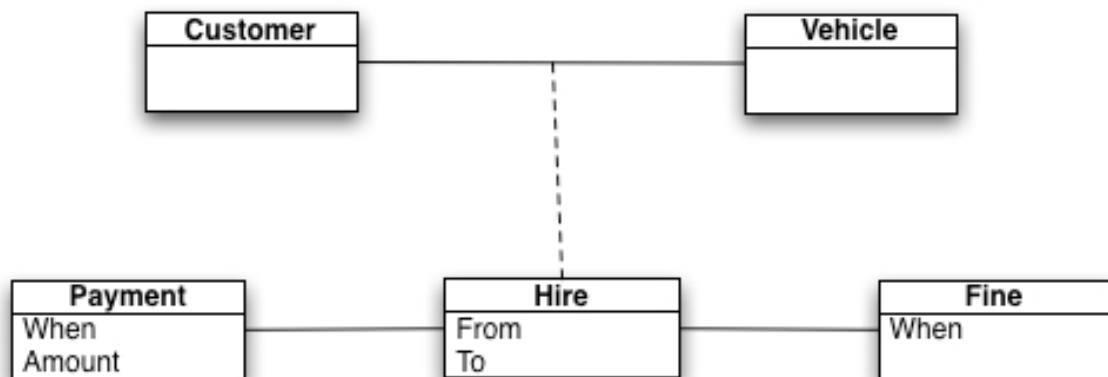
1 marks for correct objects

1 ½ marks for repeat

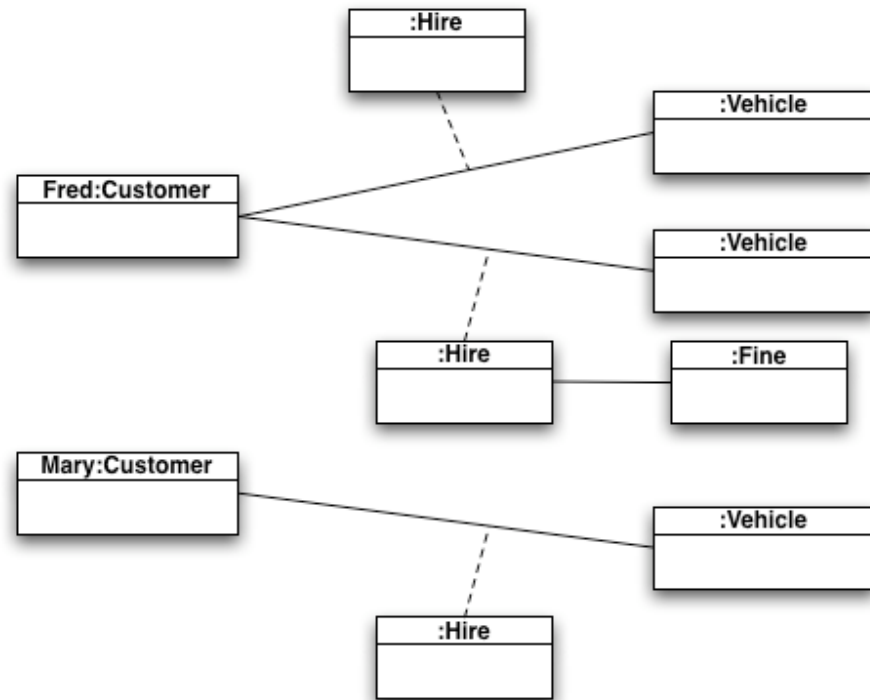
1 ½ marks correct method calls

### QUESTION 2 (10 marks)

Given the following class diagram, create an object diagram for the scenario when a customer (Fred) has hired two cars in the past. Mary, his wife, is currently hiring a Toyota Corolla. Fred had received a speeding fine whilst driving the first of his hire cars.



### Solution



**Marking**

**5 marks**

**Appropriate objects (including naming fred & mary)**

**5 marks**

**Appropriate links**

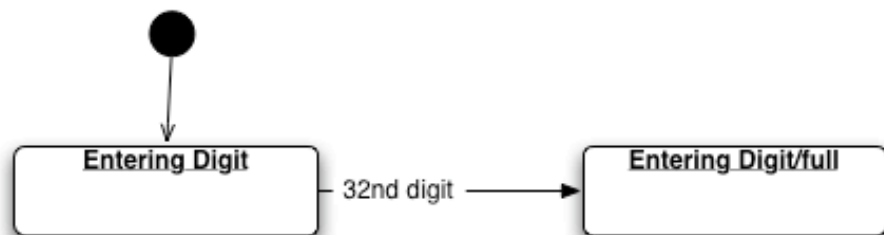
**Made up attributes – -3**

### QUESTION 3 (10 marks)

A phone with a display allows you to edit phone numbers that you have entered. The phone contains controls for moving the cursor left and right, a delete (which deletes the digit to the left of the cursor), a “talk” button and the digits 0-9.

You can enter phone numbers up to 32 digits long. When the phone is currently storing 32 digits any further digits entered replace the digit to the left of the cursor.

Draw a state diagram for the system involved in entering/editing a phone number. Note any guards/actions you would have on the transitions.



press digit [not 32nd digit]/insert after cursor, advance cursor

press delete [cursor not at start]/delete char before cursor

cursor left [cursor not at start]/move cursor left

cursor right [cursor not at end]/move cursor right 1 char

press digit[cursor not at start]/replace char to left of cursor

press delete [cursor not at start]/delete char before cursor  
(transition back to entering digit state)

cursor left [cursor not at start]/move cursor left

cursor right [cursor not at end]/move cursor right 1 char

Pressing "talk" exits either state and the state diagram

### Marking

The states may not be the same as here (they could have just one state, with more complicated guards). An approximate marking scheme is...

3 marks - appropriate states

7 marks - transitions -

events 3

guards 2

actions 2